

A REVIEW OF THE LEAFHOPPER GENUS *ACRULOGONIA* (HOMOPTERA: CICADELLIDAE) WITH DESCRIPTIONS OF NEW SPECIES¹

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ABSTRACT: The genus *Acrulogonia* was established by Young (1977) who included eleven species: *A. chocona*, *A. defectiva*, *A. fuscinula*, *A. incompta*, *A. ordinaria*, *A. pararesima*, *A. reclusa*, *A. resima*, *A. mucidula*, *A. smidti* and *A. sparsa*. In this paper we present a key to species and describe two new species from Costa Rica: *A. sexspinoso* and *A. tecta*. The latter is also present in Panama and Nicaragua. *A. ordinaria* is here reported from Costa Rica for the first time. The genus ranges from Nicaragua to Bolivia.

The genus *Acrulogonia* was described and illustrated by Young (1977), who described nine species: *A. chocona*, *A. defectiva*, *A. fuscinula*, *A. incompta*, *A. ordinaria*, *A. reclusa*, *A. resima*, *A. sparsa* and *A. pararesima*. Young also placed *Tattigoniella mucidula* Jacobi and *Poeciloscarta smidti* Metcalf in this genus. *Acrulogonia* occurs in Nicaragua, Costa Rica, Panama, Colombia, Venezuela, Peru, Bolivia, French Guiana, Guayana and northeastern Brazil. *A. pararesima* and *A. ordinaria* occur in Panama and Costa Rica, the latter being a new record for Costa Rica. *A. ordinaria* has been collected from 700-1700 m in February and June. In this paper we describe two new species from Costa Rica: *A. sexspinoso* from Costa Rica and *A. tecta* from Costa Rica and Nicaragua.

Acrulogonia

Type-species: *Poeciloscarta smidti* Metcalf

Medium-size leafhoppers. Color pale brown to dark brown, sprinkled with small spots and occasionally with pale vermiculations, and, in some species, with large pale orange to bright orange spots on the forewings.

Head weakly produced, anterior margin broadly rounded in dorsal view; clypeus slightly flattened medially, clypellus with profile of its ventral aspect slightly more horizontal than remainder of contour of face. Thorax with pronotal width equal to or less than transocular width of head; forewing with membrane absent or limited to inner apical cell or to inner two apical cells, texture translucent to opaque; hindlegs with femoral setal formula 2:1:1 or 2:1:1:1.

Male genitalia: pygofer scarcely to moderately produced with posterodorsal

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process varying interspecifically in position from anteapical to apical and with additional process in some species, macrosetae varying from two to twenty, limited to apical half of pygofer; aedeagus symmetrical, shaft elongate, apex abruptly curved at right angle to long axis of shaft, shaft usually with at least one pair of processes.

MATERIAL AND METHODS

The details of preparations of genital structures of leafhoppers for dissections and study are given by Oman (1949). We have followed his method with some modifications. A system was devised in which the abdomens of 10 leafhoppers were cleared simultaneously. Abdomens were removed, placed in ten percent potassium hydroxide and left to soak overnight at room temperature. The following day individual abdomens were washed in water before examination and eventual preservation in glycerin in microvials.

Specimens are deposited in the following collections:

CAS: California Academy of Sciences, San Francisco, USA

INBio: Instituto Nacional de Biodiversidad, Santo Domingo, Heredia, Costa Rica.

NHM: The Natural History Museum, London, UK

UCR: University of Costa Rica, San Pedro, San José, Costa Rica.

USNM: United States National Museum, Washington, USA

USU: Utah State University, Logan, USA.

MEN: Museo Entomológico, León, Nicaragua.

Acrulogonia sexspinosa NEW SPECIES

Figs. 1-6

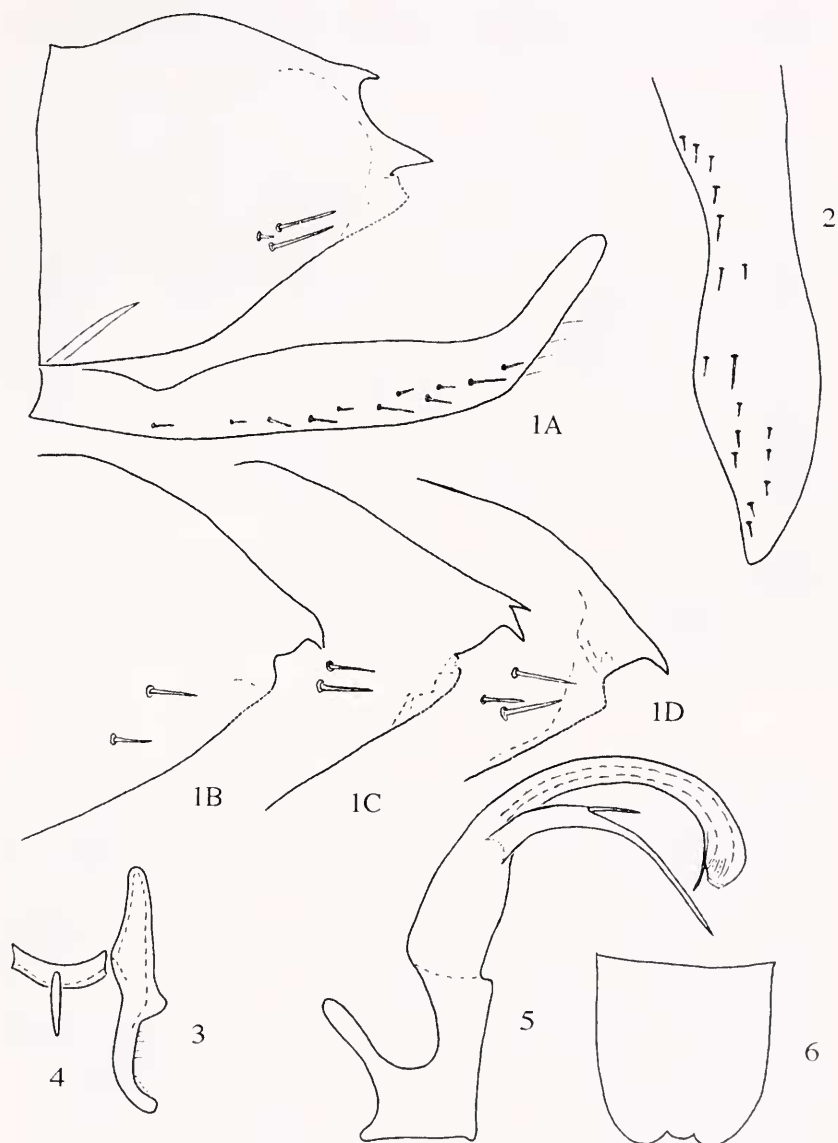
Length: Male 9.2-11.2 mm, female 10.0-11.5 mm.

Color of dorsum entirely brown, sprinkled with small pale spots. Crown irregularly dotted with beige, pronotum with beige small spots and with or without pair of orange lateral markings, scutellum brown with beige dots. Forewings opaque, with proximal irregular orange markings, proximal area of corium, discal cells and subapical cell with small pale and beige spots; face brown with a median and lateral longitudinal pale stripes.

Head weakly produced, with median length of crown slightly more than one half interocular width and approximately one-third transocular width, without carina at transition from crown to face, ocelli located on line between anterior eye angles, each slightly closer to adjacent anterior eye angle than to median of crown; crown in lateral view slightly concave medially across ocelli, lateral clypeal sutures extending onto crown and attaining ocelli; clypeus slightly flattened medially, muscle impressions distinct.

Thorax with pronotal width less than transocular width of head, disc rugose and punctate. Forewings with membrane limited to inner two apical cells. Hindlegs with femoral setal formula 2:1:1, length of first tarsomere greater than combined length of second and third tarsomeres.

Male genitalia: Pygofer variable with or without an anteapical dorsal process with a simple or bifid apex, process with two or three macrosetae near middle (Figs. 1A-1D). Plates elongate, triangular, narrowed in basal half, weakly fused basally, not extending posteriorly beyond pygofer apex, broadened near base and anteapically, with multiserial setae (Fig. 2). Style without preapical lobe, extending farther posteriorly than apex of connective (Fig. 3). Connective Y-shaped with arms divergent, stem keeled (Fig. 4). Aedeagus symmetrical, shaft elon-



Figs. 1-6. *Acrulogonia sexspinosa*, n. sp. 1 A, B, C, D. Pygofer, lateral view; 2. Plate, ventral view; 3. Style dorsal view; 4. Connective dorsal view; 5. Aedeagus, lateral view; 6. Female abdominal sternum VII.

gate, curved dorsally with short acute pair of ventral processes arising before apex, shaft with one pair of processes arising ventrally slightly before middle of shaft extending apically anteriorly with elongate slender acute dorsal process arising at midlength (Fig. 5).

Female abdominal sternum VII, with rounded median lobe (Fig. 6).

Holotype male: COSTA RICA, Puntarenas, Peninsula de Osa, Rancho Quemado Apr 1991, J. C. Saborio, LS 292500, 511000 (INBio).

Paratypes: 1 ♂, 3 ♀ same data as holotype except, 200 m Jun 1992, F. Quesada, 1 ♂ Apr 1991; 1 ♂ Mar 1992; 3 ♂, 2 ♀ Set. 1991 (INBio, NHM, USNM); 1 ♀ same locality and collector, Jul 1992; 2 ♂, May 1992, F. Quesada & G. Varela; 1 ♂ P. N. Corcovado, Sendero a Rio Claro, Jan-Mar 1992, Malaise trap LS 508300-270500 (INBio, CAS); 2 ♂ Est. Sirena, 0-100 m, Nov 1989, G. Fonseca, 270500-508300; 2 ♂ same data, 50 m, IV-VIII 1989; 1 ♂ same locality 17 Jun a 4 Sep 1991, Malaise trap; 3 ♂ Fila Madre, 3 Km. SO de Cerro Rincón, 545-710 m, 25-26 May 1995, A. Picado, LS 273300-520000; 1 ♀ same locality, Dic 1989-Mar 1990, Hanson (UCR); 1 ♂, 1 ♀ Cerro Rincón 200 m S del Hito, 744 m, Dic 1989-Mar 1990 (UCR); 8 ♂, 1 ♀ Cerro Rincón 200 m S del Hito, 744 m, Sep 1990 (UCR, USU); 2 ♂, 2 ♀ Golfo Dulce, 3 km SW. Rincón, 10m, Mar-May-1989, Hanson (UCR); 11 ♂ Quepos Manuel Antonio, Apr 1991, G. Varela, LS 370900-448800; 1 ♂ Pen. Osa, Bosque Esquinas, 200 m. Jun 1994, J. F. Quesada, 302400-545250; 3 ♂ Est. Agujas, Sendero Zia, Rio Agujas, 300 m. 2-15 Jan 1996, A. Azofeifa. T. Foso, LS 276750-526550; 2 ♀ P. N. Corcovado, Est. Sirena, 17 Jun-4 Set 1991, LS 270500-508800; 3 ♀ same locality, 50 m, Apr-Aug 1989 (INBio).

Remarks.

Acrulogonia sexspinosa is similar to *A. paraesima* but the former can be separated by its aedeagus, which has a pair ventral processes at the apex extending anteriorly, each with a bifid tapering acute process. This species has been collected from 0-750 m in the wet lowlands.

Acrulogonia tecta NEW SPECIES

Figs. 7-13

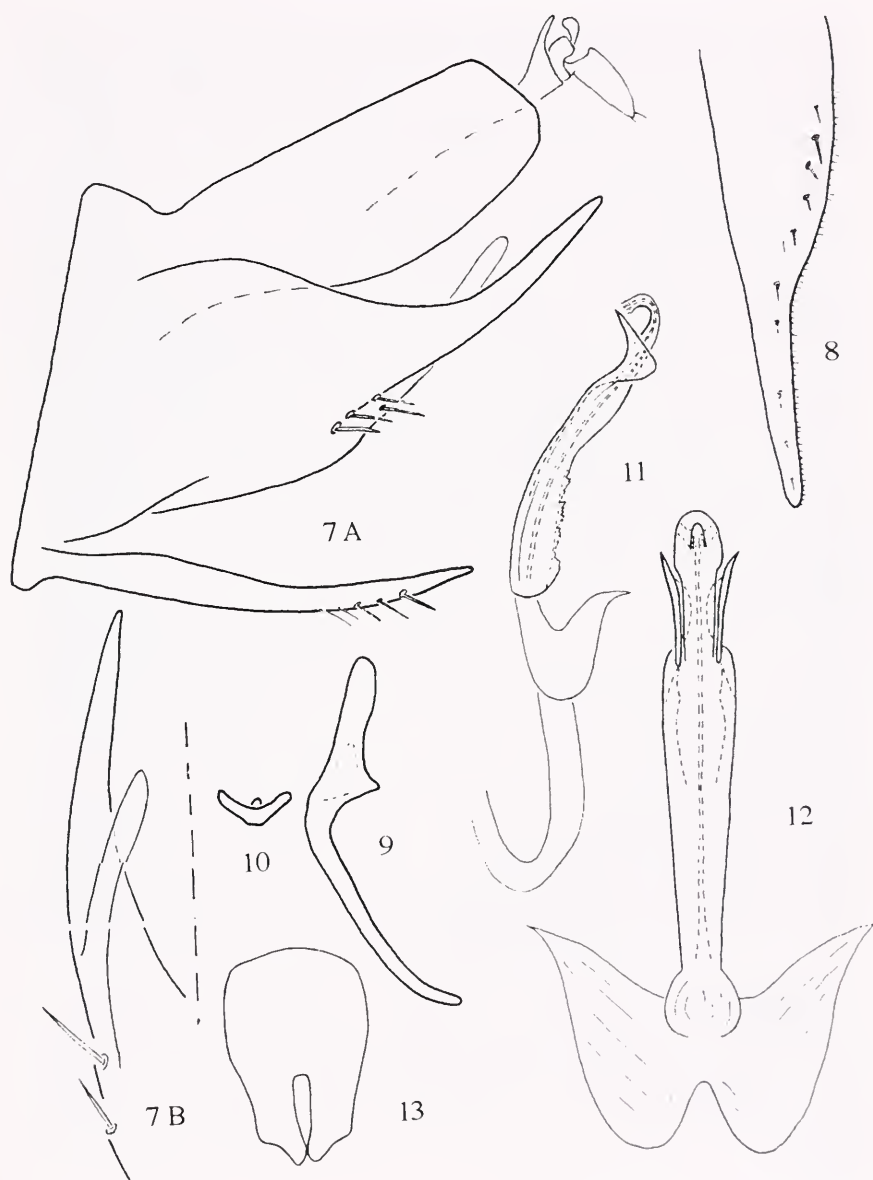
Length: Male 6.3-8.0 mm, female 6.5-7.7 mm.

Color of dorsum entirely brown, sprinkled with small pale yellow spots. Crown, pronotum, and scutellum brown sprinkled with small pale spots. Forewings translucent with red veins, claval area with small pale spots, remainder sprinkled with small pale yellow spots; face brown with median and lateral longitudinal pale stripes.

Head weakly produced, with median length of crown slightly more than one half interocular width and approximately one-third transocular width, without carina at transition from crown to face, ocelli located on line between anterior eye angles, each slightly closer to adjacent anterior eye angle than to median of crown, lateral clypeal sutures extending onto crown and attaining ocelli; clypeus slightly flattened medially, muscle impressions distinct.

Thorax with pronotal width less than transocular width of head. Forewings slightly opaque with membrane limited to inner two apical cells. Hindlegs with femoral setal formula 2:1:1, length of first tarsomere greater than combined length of second and third tarsomeres.

Male genitalia: Pygofer abruptly narrowed posteriorly, strongly produced into an acute process which is directed caudadorsally, with four macrosetae on ventral margin near its midlength (Fig. 7A); with a less sclerotized ventral process, arising externally but directed internally, that does not exceed the length of the pygofer (Fig. 7B). Plates slender and triangular, narrowed in apical half, weakly fused basally, not extending posteriorly nearly as far as pygofer apex, with uniseriate setae in basal two-thirds of their length (Fig. 8). Style without



Figs. 7-13. *Acrulogonia tecta*, n. sp. 7 A. Pygofer, lateral view; 7 B. Pygofer, lateral view apex, ventral view; 8. Plate, ventral view; 9. Style dorsal view; 10. Connective dorsal view; 11. Aedeagus, lateral view; 12. Aedeagus, caudoventral view; 13. Female abdominal sternum VII

preapical lobe, extending farther posteriorly than apex of connective (Fig. 9). Connective U-shaped with arms divergent, stem keeled (Fig. 10). Aedeagus symmetrical, shaft elongate, in lateral view apex curved dorsally, except apical portion, shaft with one pair of lanceolate processes arising ventral laterally slightly beyond midpoint of shaft (Fig. 11), in caudoventral view these processes not extending to apex (Fig. 12).

Female abdominal sternum VII with posterior margin deeply emarginate (Fig. 13).

Holotype: Male: COSTA RICA, Guanacaste, Estación Pitilla, 9 Km. S Sta Cecilia, 700 m. May 1991. P. Rios, L-N 330200, 380200 (INBio).

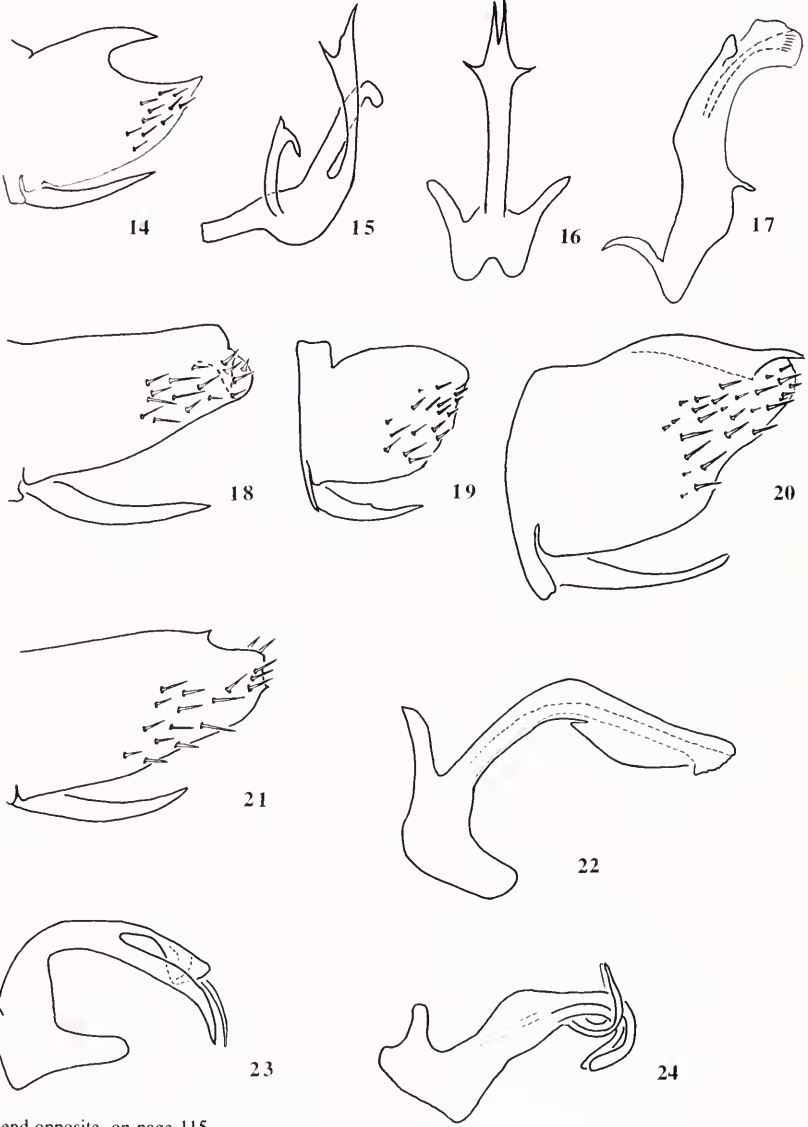
Paratypes: COSTA RICA, 4 ♂, 1 ♀, same data as holotype; 1 ♂, 1 ♀, Jul 1991; 1 ♂, 2 ♀ May 1994; 1 ♂ Apr 1995; 2 ♂, 6 ♀, Oct. 1993; 1 ♀, Oct 1994, ypt; 2 ♂ Jun 1994, ypt; 8 ♂, 5 ♀, Jan 1994, Malaise trap; 1 ♀, Feb 1995, ypt; 1 ♀, Aug 1994, ypt; 1 ♀, Jun 1991, Malaise trap; 1 ♂ Nov 1989, Col. C. Moraga & P. Rios; 2 ♀ same locality, Mar 1991; 1 ♀, Jul 1995; 1 ♂, 1 ♀, 29 Mar-5 Apr 1995 C. Moraga, Malaise trap; 1 ♂ 22 Aug 1993; 1 ♂ Aug 1994; 1 ♂ May 1991; 1 ♂, 2 ♀, 31 Mar-29 Apr 1992, S. Rojas; 2 ♀ K. Taylor; 1 ♂ Nov 1988 GNP Biodiversity Survey; 2 ♀, Jul 1988 (INBio); 3 ♂, 5 ♀ II curso parataxon, May 1990 (INBio, NHM, USNM, USU); 1 ♀, May 1992, F. Araya; 1 ♀, Jan-Apr 1992, Malaise trap; 1 ♂ Aug 1994, J. Acosta, Y. Umaña; 1 ♂ Jul 1991 (CAS); 1 ♂ Apr 1989, I. Gauld (UCR); 2 ♀, Sep 1989, I. Gauld (UCR); 2 ♂ Sendero Nacho, May 1994, P. Rios. Other material, COSTA RICA, Guanacaste 1 ♂ Z. P. Tenorio, Tierras Morenas, Rio San Lorenzo, 1050 m. 28 Mar-21 Apr 1992, A. Marin; 1 ♂ 18 Mar-26 Apr 1995, G. Rodriguez; 1 ♂ Est. Cacao SW side Volcan Cacao, 1000-1400 m. 1988-1989, Malaise trap, GNP Biodiv. Survey, 323300-375700; 1 ♀ Jan-Apr 1992, Malaise trap, 1000-1400 m, May 1991, Elfin Rainforest 91; 2 ♂ *Prov. Alajuela*, Res. Fores. San Ramón, 5 Km N Col. Palmareña, Rio San Lorencito, 900 m, Mar 1990, Curso Carabidae, 244500-470700, 7 Mar-16 Apr 1995, Malaise trap; 1 ♂ Sector Colonia Palmareña 9 Km S. O. de Bajo Rodriguez, 700 m, 9 Sep-18 Oct 1995, G. Carballo, Malaise trap; 2 ♀, 21 Oct. 3 Nov 1994; 1 ♂, 2 ♀, same locality and collector, 15-28 Nov 1994; 1 ♂ same locality and collector, Set 1995; 2 ♀, Nov 1994; 1 ♂, 1 ♀, same locality, 620 m, 22 Jun-23 Jul. 1994, Fam. Hurtado G., Malaise trap; *Prov. San Jose*; 1 ♂ Est. Las Nubes de Santa Elena, Fca. de Olman Bonilla, 1450 m. 1 Oct. 1995, A. Picado L-S 372500-507700. *Prov. Cartago*, 1 ♂ Quebrada Segunda Tapantí, 1150 m. Aug 1994, G. Mora, Malaise trap., LN 194000-560000; 1 ♂, 1 ♀, P. N. Tapantí, A. C. Amistad, 1300 m. Nov 1993, G. Mora, Malaise trap., LN 194000-559800; 1 ♀, Jul 1991; 1 ♂ R. Grande de Orosí desde sendero La Pava hasta La Catarata, 1300-1700, Aug 1995, R. Delgado, Malaise trap., LN 191500-560400; 1 ♀, Dic. 1995, G. Mora; 3 ♀ Turrialba, Grano de Oro, Chirripo, A.C. Amistad, 1120 m, Oct. 1993, P. Campo, LN 200250-595900. *Prov. Puntarenas*, 1 ♂ Est. Altamira, Sendero Educativo Gigantes del Bosque, 1150-1400, 1-15 Nov 1994, M. Segura, Malaise trap. 331700-572100 (INBio), NICARAGUA, 2 ♂, Zelaya, Rio Las Latas, 2 Jun. 1977, 220 m. 11° 04' N, 88° 33' W, J. M. Maes & B. Hernández (MEN).

Remarks:.

Acrulogonia tecta is similar to *A. ordinaria* but the former can be separated by the form of the male pygofer which abruptly narrows and has a pair of ventral processes (*A. ordinaria* has just one dorsal process); also, the aedeagus of *A. tecta* has just one pair of ventral lateral processes whereas *A. ordinaria* has two pairs of processes. *A. tecta* has been collected from 200 to about 1400m elevation.

KEY TO MALES IN THE GENUS *ACRULOGONIA*

1. Plate not extending to apex of pygofer 2
- Plate extending beyond apex of pygofer 10
2. Pygofer with a conspicuous dorsal process extending posteriorly from near middle of dorsal margin (fig. 14) *fuscina* Young
- Pygofer lacking dorsal process or small process arising near caudal margin of pygofer 3
3. Pygofer process slender, extending posteriorly beyond pygofer apex which is narrowed and not or only slightly wider than the process 4
- Pygofer process not as above, or if so then pygofer apex not narrowed, broader than process 7
4. Aedeagus with pair of lateral processes near base (fig. 15) *chocona* Young
- Aedeagus without lateral processes near base (with ventral process slightly more distally, or not) 5
5. Aedeagus with pair of slender apical processes extending beyond apex of shaft (fig. 16) *mucidula* (Jacobi)
- Aedeagus without processes extending beyond apex of shaft 6
6. Forewing with two or three orange spots on corium; aedeagus with pair of lanceolate lateral processes arising dorsally at midlength of shaft (fig. 11) .. *tecta* n. sp.
- Forewing without orange spots on corium; aedeagus with pair of short aciculate processes arising on ventral margin of shaft near base, and pair of variable dorsal process arising subapically (fig. 17) *incompta* Young
7. Dorsal pygofer process strongly decurved in lateral view (fig. 18) *resima* Young
- Dorsal pygofer process not strongly decurved 8
8. Pygofer relatively short and broad, aedeagus with retrorse lateral processes on apical half of shaft (fig. 19) *defectiva* Young
- Pygofer longer and more slender, aedeagus without such processes 9
9. Dorsal pygofer process well developed, extending posteriorly to or beyond pygofer apex (fig. 20) *ordinaria* Young
- Dorsal pygofer process weak, short, not attaining pygofer apex (fig. 21) *smidti* (Metcalf)
10. Aedeagus with median ventral keel in apical half (fig. 22) *reclusa* Young
- Aedeagus without median ventral keel 11
11. Aedeagus in lateral view with one pair of subapical processes (fig. 23) *sparsa* Young
- Aedeagus in lateral view with two pairs of subapical processes 12
12. Forewing with two pale red suboval spots broadly bordered with black on corium near costa; aedeagal processes simple, without rami (fig. 24) *pararesima* Young
- Forewing with numerous white dots and two large orange spots on the lateral corium, few orange spots near base of clavus; aedeagal processes bifid (fig. 5) *sexpinosa* n. sp.



legend opposite, on page 115.

ACKNOWLEDGMENTS

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Fig. 14. *Acrulogonia fuscinula* Young: Pygofer lateral view (modified from Young, 1977). Fig. 15. *Acrulogonia chocona* Young: Aedeagus, lateral view (modified from Young, 1977). Fig. 16. *Acrulogonia mucidula* (Jacobi): Aedeagus, caudoventral view (modified from Young, 1977). Fig. 17. *Acrulogonia incompta* Young: Aedeagus lateral view (modified from Young, 1977). Fig. 18. *Acrulogonia resima* Young: Pygofer lateral view (modified from Young, 1977). Fig. 19. *Acrulogonia defectiva* Young: Pygofer lateral view (modified from Young, 1977). Fig. 20. *Acrulogonia ordinaria* Young: Pygofer lateral view (modified from Young, 1977). Fig. 21. *Acrulogonia smidti* (Metcalf): Pygofer lateral view (modified from Young, 1977). Fig. 22. *Acrulogonia reclusa* Young: Aedeagus, lateral view (modified from Young, 1977). Fig. 23. *Acrulogonia sparsa* Young: Aedeagus, lateral view (modified from Young, 1977). Fig. 24. *Acrulogonia pararesima* Young: Aedeagus lateral view (modified from Young, 1977).